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Centre Number	Candidate Number	Name

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education
Advanced Subsidiary Level and Advanced Level

BIOLOGY **9700/02**

Paper 2 Structured Questions AS

October/November 2004

1 hour 15 minutes

Candidates answer on the Question Paper.
No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name in the spaces provided at the top of this page.
Write in dark blue or black pen in the spaces provided on the Question Paper.
You may use a soft pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions.
The number of marks is given in brackets [ ] at the end of each question or part question.

If you have been given a label, look at the details. If any details are incorrect or missing, please fill in your correct details in the space given at the top of this page.

Stick your personal label here, if provided.

FOR EXAMINER'S USE	
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TOTAL	

This document consists of **12** printed pages and **4** blank pages.

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Answer **all** the questions.

1 Fig. 1.1 is a drawing made from an electron micrograph. It shows a longitudinal section through a sieve tube element and a companion cell in the phloem of a flowering plant.

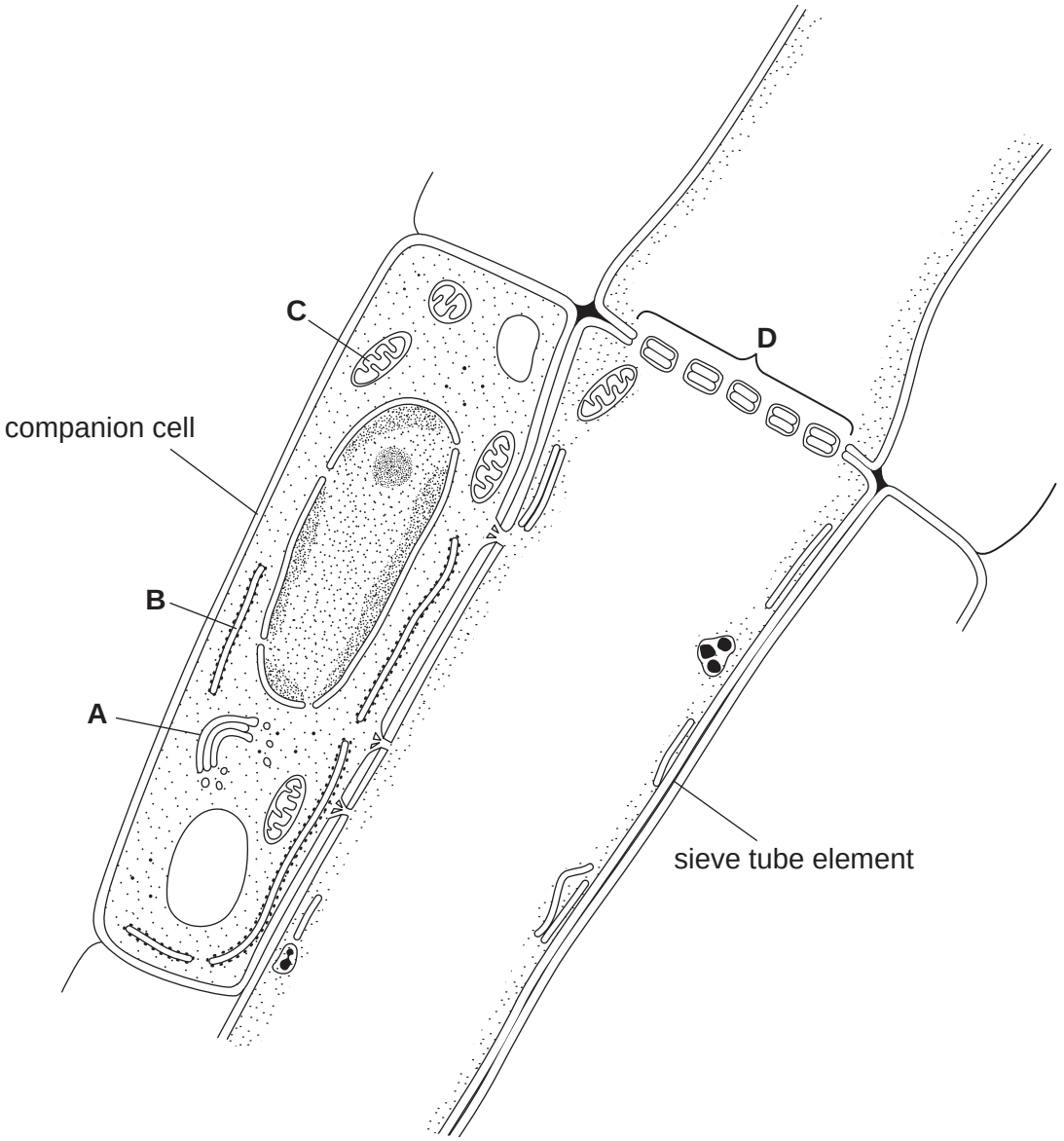


Fig. 1.1

(a) Refer to Fig. 1.1.

(i) Name structures **A** to **C**.

A .....

B .....

C .....[3]

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(ii) State the name given to the region labelled **D** that separates the two sieve tube elements.

.....[1]

(iii) Name **one assimilate** that is transported in the phloem.

.....[1]

(b) Explain how the structure of sieve tube elements helps the translocation of substances in the phloem.

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.....[3]

(c) Describe the role of companion cells in translocation in the phloem.

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.....[2]

[Total : 10]

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[Turn over

2 Fig. 2.1 shows a β glucose molecule.

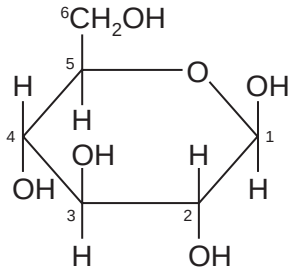


Fig. 2.1

(a) State how **α glucose** differs from β glucose as shown in Fig. 2.1.

.....[1]

(b) Fig. 2.2 shows a molecule of β glucose that is about to be added to the end of a growing chain of a polysaccharide.

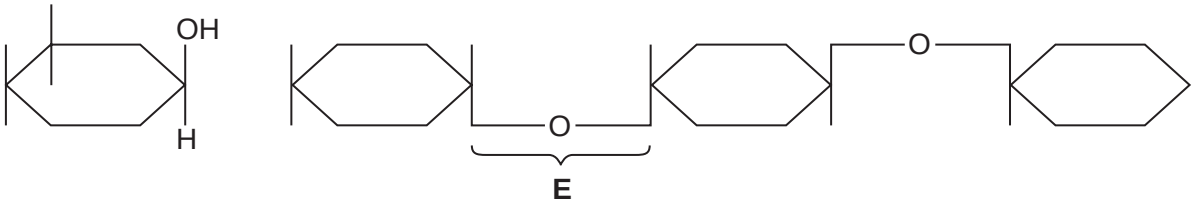
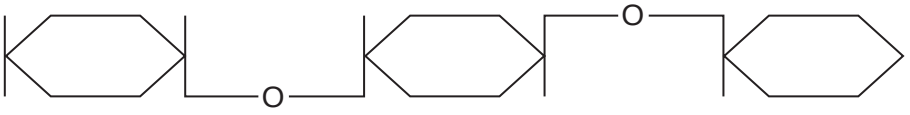


Fig. 2.2

(i) Name the bond **E**.

.....[1]

(ii) Use the diagram below to show how the β glucose molecule will attach to the end of the growing chain of the polysaccharide. You may annotate the diagram if you wish.



[3]

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(iii) Name a polysaccharide that is formed entirely from β glucose molecules in the way shown in Fig. 2.2.

.....[1]

(c) A solution of starch was poured into six separate test-tubes, labelled **F** to **K**. The test-tubes were kept at 35 °C for 5 minutes and then treated as shown in Table 2.1. After a further 30 minutes the contents of the test-tubes were tested for the presence of reducing sugar.

Table 2.1

test-tubes	substances added after 5 minutes	presence or absence of reducing sugar after 30 minutes
F	distilled water	absent
G	amylase + boiled maltase	present
H	amylase + distilled water	present
I	boiled amylase + maltase	absent
J	amylase + maltase	present
K	maltase + distilled water	absent

Explain the results shown in Table 2.1.

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.....[4]

[Total : 10]

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3 **(a)** Complete the table below by describing **one** role in living organisms for each of the ions listed.

ion	role in living organisms
calcium	
iron	
potassium	

[3]

(b) Fig. 3.1 shows part of the nitrogen cycle in a field grazed by cows.

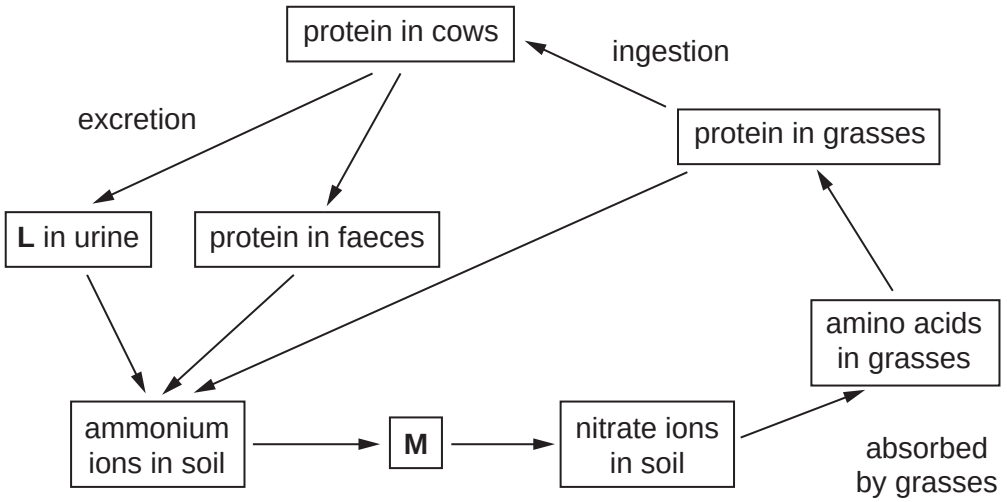


Fig. 3.1

(i) Name substances **L** and **M**.

L .....

M .....[2]

(ii) Name the process by which ammonium ions are converted to nitrate ions in the nitrogen cycle.

.....[1]

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Question 3 continues
on page 8

(c) Some young grass plants were grown with their roots in a mineral solution that contained nitrate ions. The plants were divided into two batches, **N** and **P**.

Cyanide, which inhibits aerobic respiration, was added to the solution given to the plants in batch **P**.

The quantity of nitrate ions in the plants was determined at regular intervals for 70 hours.

After 60 hours, the mineral solution was replaced by distilled water.

The results are shown in Fig. 3.2.

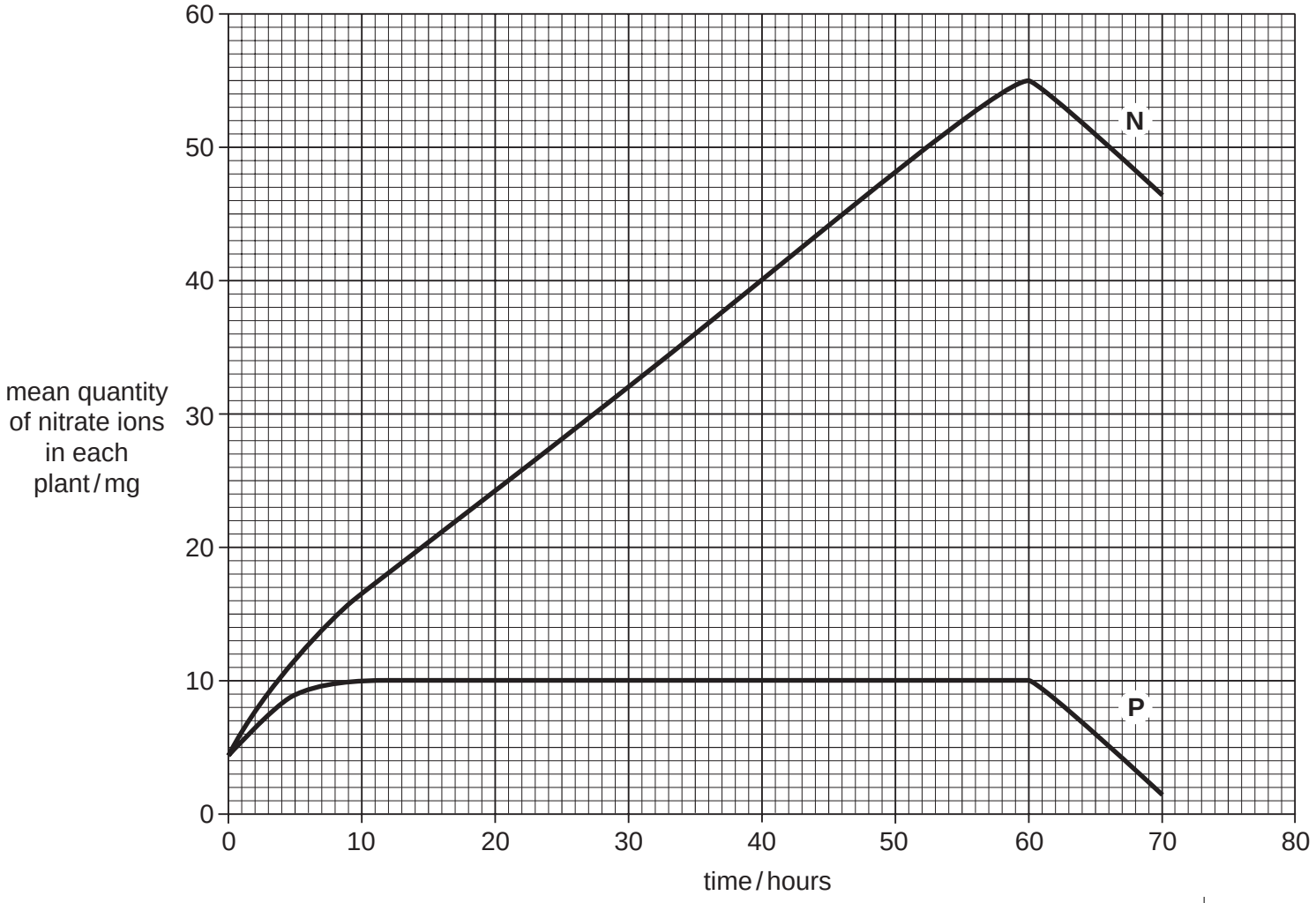


Fig. 3.2

Using the data in Fig. 3.2,

(i) calculate the rate of absorption of nitrate ions in batch **N** between 40 and 60 hours. Show your working.

Answer = ... mg per hour [2]

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(ii) explain why the absorption of nitrate ions by the plants in batch **N** differs from that in batch **P**;

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.....[4]

(iii) explain why the mean quantity of nitrate ions in **both** batches of plants decreased after 60 hours.

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.....[2]

[Total : 14]

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4 Fig. 4.1 is a diagram of a bacterium.

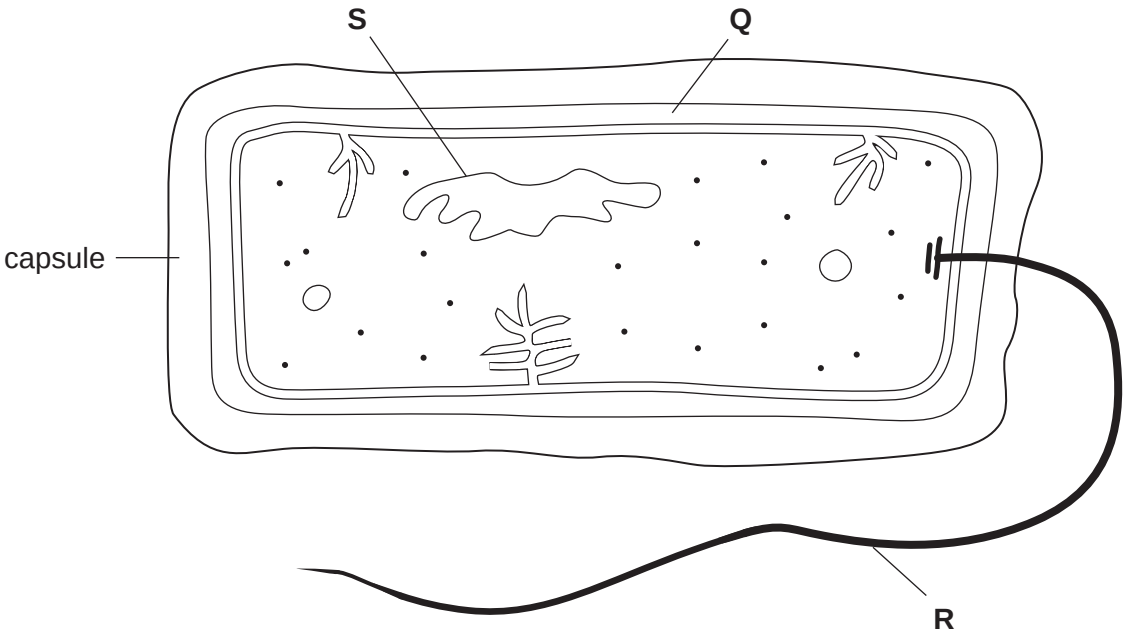


Fig. 4.1

(a) Name structures **P** to **S**.

Q .....

R .....

S .....[3]

(b) State the names of three structures that are present in a phagocyte from a mammal that are **not** present in bacteria.

1 .....

2 .....

3 .....[3]

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Tuberculosis (TB) is an infectious disease caused by a bacterium.

(c) (i) Name the bacterium that causes TB.

.....[1]

(ii) Describe how TB is transmitted from infected to uninfected people.

.....

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.....[2]

Antibiotics are used in the treatment of people with TB. The usual procedure is for people with TB to take a mixture of three or four antibiotics for up to a year.

(d) Explain why it is necessary to give people with TB this type of treatment.

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.....[3]

[Total : 12]

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5 Enzymes catalyse reactions in which substrate molecules are converted to products.

(a) There are two main approaches to investigation of the activity of an enzyme. State the two ways in which the activity of an enzyme can be found.

1 .....

.....

2 .....

.....[2]

Phosphatase enzymes remove phosphate groups from a wide range of organic compounds that contain phosphate. This makes available a supply of phosphate ions within cells. The reaction catalysed by phosphatase enzymes is as follows:

$$XPO_4 \xrightarrow{\text{phosphatase enzyme}} X + PO_4^{3-}$$

X = an organic compound

The activity of phosphatase was measured at different values of pH by using nine different buffer solutions. The temperature was kept constant at 30 °C. The results are shown in Fig. 5.1.

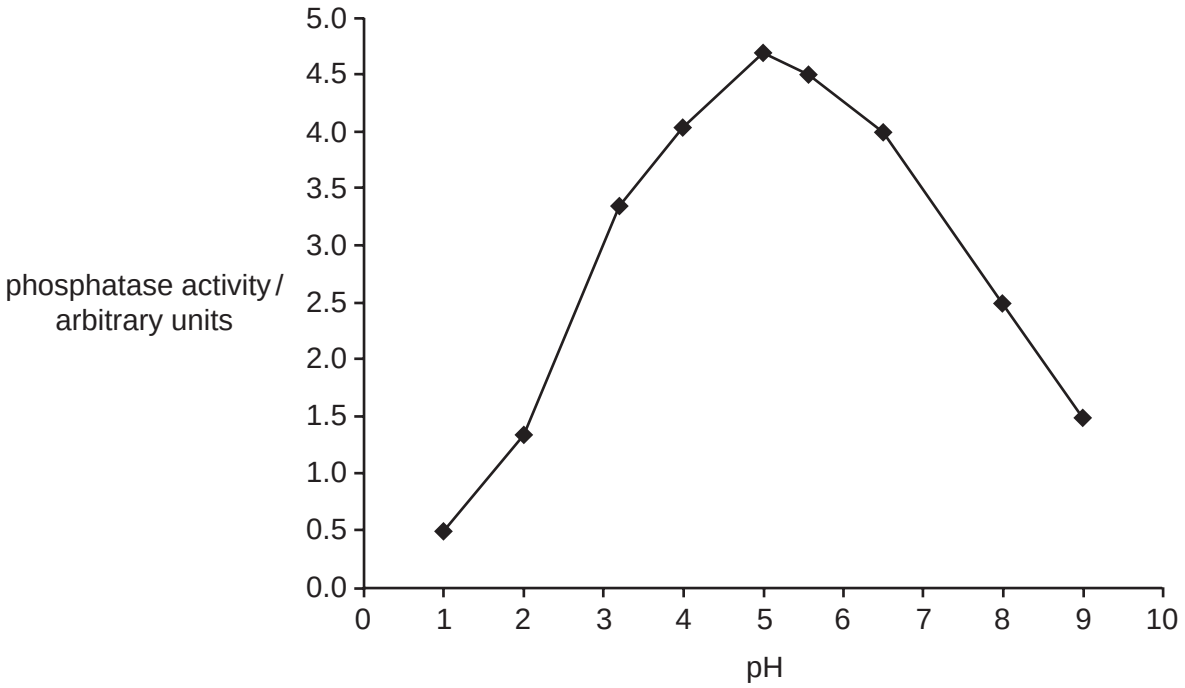


Fig. 5.1

(b) Using the data in Fig. 5.1, describe the effect of pH on the activity of phosphatase.

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.....[3]

(c) Explain why the activity of phosphatase is very low at pH 1.

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.....[4]

(d) Draw a curve on Fig. 5.1 to show the results you would expect if the experiment was repeated in exactly the same way but at a temperature of 20 °C. [2]

(e) Explain how competitive inhibitors affect the activity of enzymes, such as phosphatase.

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.....[3]

[Total : 14]

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Question 1 Fig. 1.1 EM of phloem in *Biological Science*, Cambridge University Press, 1997.

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